UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,885	01/10/2007	Alain Guillard	SERIE 6372	2244

40582 7590 09/14/2010

American Air Liquide, Inc.
Intellectual Property Dept.
2700 Post Oak Boulevard
Suite 1800
Houston, TX 77056

EXAMINER	
ZEC, FILIP	

ART UNIT	PAPER NUMBER
3744	

MAIL DATE	DELIVERY MODE
09/14/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,885	GUILLARD ET AL.	
	Examiner	Art Unit	
	Filip Zec	3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 January 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 April 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/28/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 17-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 17 recites the limitation "at least one portion of this" in line 13. It is unclear what "this" refers to. The claim has been examined as if the limitation was - - at least one portion of said stream of low purity oxygen - - .

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 11-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of U.S. Patent 5,291,737 to Camberlein et al. (Camberlein).

In reference to claim 11, AAPA discloses a method for supplying high-purity oxygen by cryogenic distillation of air (page 1, lines 29-31) from an installation comprising a first air separation unit (page 1, lines 31-32) and a second air separation unit (page 1, lines 34-35), in which, in the first step, the second air separation unit supplies high-purity oxygen to a second consuming unit (page 1, lines 33-35), but does not teach that the first air separation unit comprising a medium-pressure column, a low-pressure column thermally coupled to the

medium-pressure column, and a mixing column, in which, air to be distilled is sent to the medium-pressure column; oxygen-enriched and nitrogen-enriched liquids are sent from the medium-pressure column to the low-pressure column; in a first step of the air separation unit, an oxygen-enriched liquid stream from the low-pressure column is sent to the top of the mixing column; in the first step, a low-purity oxygen stream is withdrawn from the top of the mixing column and at least one portion of this is sent to a first consuming unit, in the first step, air is sent to the mixing column and in a second step, in the first air separation unit, the oxygen-enriched liquid stream sent to the top of the mixing column is reduced, possibly to zero, the stream of air sent to the mixing column is reduced, possibly to zero, and the stream of low-purity oxygen withdrawn from the top of the mixing column is reduced, possibly to zero and in the second step, a stream of high-purity oxygen is withdrawn from the bottom of the low-pressure column of the first air separation unit and sent to at least the second consuming unit. Camberlein shows a process for distilling air and application in feeding gas to a converter of a steel mill (FIG. 2; col 4, lines 7-9), wherein outside air is imported and supplied (via compressor 14, FIG. 2) to a lower part of a mixing column (6, FIG. 2; col 3, lines 9-12), wherein outside air is also imported (via duct 7, FIG. 2) to the lower part of the mean pressure column (3, FIG. 2) providing (via line 11, FIG. 2) impure nitrogen and "rich liquid" (oxygen enriched air) to the top of the low pressure column (4, FIG. 2), from where liquid oxygen is sent (via pump 13, FIG. 2) to the top of the mixing column (6, FIG. 2) in order to simultaneously produce impure oxygen (col 3, lines 19-22) used in blast furnaces (via line 18, FIG. 2; col 1, lines 11-16) and pure oxygen (col 3, lines 38-43) used in converters of a steel mill (col 4, lines 7-13). Additionally, one of ordinary skill in the art would find it obvious to reduce or completely stop the supply and production of low purity

oxygen (the work of mixing column 6, FIG. 2) when said oxygen is not needed while still supplying the high purity oxygen (the work of the double column 2, FIG. 2) in order to consume less energy and improve the cost efficiency of the system.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of AAPA, to have the first separator providing the impure oxygen using process and apparatus for distilling air and application in feeding gas to a converter of a steel mill, wherein outside air is imported and supplied to a lower part of a mixing column, wherein outside air is also imported to the lower part of the mean pressure column providing impure nitrogen and "rich liquid" (oxygen enriched air) to the top of the low pressure column, from where liquid oxygen is sent to the top of the mixing column, as taught by Camberlein, in order to simultaneously produce impure oxygen used in blast furnaces and pure oxygen used in converters of a steel mill and to reduce or completely stop the supply and production of low purity oxygen (the work of mixing column) when said oxygen is not needed while still supplying the high purity oxygen (the work of the double column) in order to consume less energy and improve the cost efficiency of the system.

In reference to claim 12, AAPA and Camberlein teach the method as explained in the rejection of claim 11, and AAPA teaches that the second air separation unit does not supply high-purity oxygen to the second consuming unit (page 2, lines 1-8).

In reference to claim 13, AAPA and Camberlein teach the method as explained in the rejection of claim 11, and AAPA teaches that the first consuming unit is a blast furnace (page 1, lines 24-27) and the second consuming unit is a converter or an arc furnace (page 1, lines 27-29).

In reference to claim 15, AAPA and Camberlein teach the method as explained in the rejection of claim 11, and AAPA does not teach that the mixing column does not operate during the second step. Camberlein shows a process and apparatus for distilling air and application in feeding gas to a converter of a steel mill (FIG. 2; col 4, lines 7-9), comprising a mixing column (6, FIG. 2; col 3, lines 9-12), a mean pressure column (3, FIG. 2) and a low pressure column (4, FIG. 2) in order to simultaneously produce impure oxygen (col 3, lines 19-22) used in blast furnaces (via line 18, FIG. 2; col 1, lines 11-16) and pure oxygen (col 3, lines 38-43) used in converters of a steel mill (col 4, lines 7-13). Additionally, one of ordinary skill in the art would find it obvious to reduce or completely stop the supply and production of low purity oxygen (the work of mixing column 6, FIG. 2) when said oxygen is not needed while still supplying the high purity oxygen (the work of the double column 2, FIG. 2) in order to consume less energy and improve the cost efficiency of the system.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of AAPA and Camberlein, to reduce or completely stop the supply and production of low purity oxygen (the work of mixing column) when said oxygen is not needed while still supplying the high purity oxygen (the work of the double column) in order to consume less energy and improve the cost efficiency of the system.

In reference to claim 16, AAPA and Camberlein teach the method as explained in the rejection of claim 11, and AAPA teaches that the second consuming unit is fed with oxygen only from the second air separation unit during the first step (page 1, lines 34-35), but does not teach that the second consuming unit is fed with oxygen only from the first air separation unit during the second step. Camberlein shows a process and apparatus for distilling air and application in

feeding gas to a converter of a steel mill (FIG. 2; col 4, lines 7-9), comprising a mixing column (6, FIG. 2; col 3, lines 9-12), a mean pressure column (3, FIG. 2) and a low pressure column (4, FIG. 2) in order to simultaneously produce impure oxygen (col 3, lines 19-22) used in blast furnaces (via line 18, FIG. 2; col 1, lines 11-16) and pure oxygen (col 3, lines 38-43) used in converters of a steel mill (col 4, lines 7-13). Additionally, one of ordinary skill in the art would find it obvious to utilize only the work of the first separation unit (as taught by Camberlein) since AAPA teaches that the second separation unit is not working during the second step (page 2, lines 1-5) in order to consume less energy and improve the cost efficiency of the system.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of AAPA and Camberlein, to provide the pure oxygen only from the first separating unit during the second step, as taught by Camberlein, in order to consume less energy and improve the cost efficiency of the system.

In reference to claim 20, AAPA and Camberlein teach the method as explained in the rejection of claim 16, and AAPA does not teach at least one high-purity oxygen compressor upstream of the second consuming unit and downstream of the first air separation unit. Camberlein teaches supplying the pure oxygen under pressure (col 3, lines 43-46) which inherently implies using a compressor, since the oxygen is in gaseous form (in duct 22, FIG. 2) or a pump (23, FIG. 2) if in fact, the pure oxygen is in liquid form (col 3, lines 46-48) in order to convey said oxygen to the consuming unit (converter; col 4, lines 7-11).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of AAPA and Camberlein, to provide pressurized pure oxygen using a compressor located between the low pressure column of the first separator

and the converter, as taught by Camberlein, in order to convey said oxygen to the consuming unit.

In reference to claim 17, AAPA discloses an installation for supplying oxygen by cryogenic distillation of air, comprising a first air separation unit (page 1, lines 31-32) and a second air separation unit (page 1, lines 34-35) and means for sending high-purity oxygen from the second air separation unit to a second consuming unit (page 1, lines 33-35), but does not teach that the first air separation unit comprising a medium-pressure column, a low-pressure column thermally coupled to the medium-pressure column, and a mixing column, which installation comprises means for sending air to be distilled to the medium-pressure column, means for sending oxygen-enriched and nitrogen-enriched liquids from the medium-pressure column to the low-pressure column; means for sending a stream of oxygen-enriched liquid from the low-pressure column to the top of the mixing column; means for sending air to the bottom of the mixing column; means for withdrawing a stream of low-purity oxygen from the top of the mixing column and means for sending at least one portion of this to a first consuming unit; characterized in that it includes means for reducing, possibly to zero, the stream of oxygen-enriched liquid sent to the top of the mixing column; means for reducing, possibly to zero, the air sent to the bottom of the mixing column; and means for withdrawing a stream of high-purity oxygen from the bottom of the low-pressure column of the first air separation unit and means for sending this stream to the second consuming unit. Camberlein shows an apparatus for distilling air and application in feeding gas to a converter of a steel mill (FIG. 2; col 4, lines 7-9), wherein outside air is imported and supplied (via compressor 14, FIG. 2) to a lower part of a mixing column (6, FIG. 2; col 3, lines 9-12), wherein outside air is also imported (via duct 7, FIG. 2) to

the lower part of the mean pressure column (3, FIG. 2) providing (via line 11, FIG. 2) impure nitrogen and "rich liquid" (oxygen enriched air) to the top of the low pressure column (4, FIG. 2), from where liquid oxygen is sent (via pump 13, FIG. 2) to the top of the mixing column (6, FIG. 2) in order to simultaneously produce impure oxygen (col 3, lines 19-22) used in blast furnaces (via line 18, FIG. 2; col 1, lines 11-16) and pure oxygen (col 3, lines 38-43) used in converters of a steel mill (col 4, lines 7-13). Additionally, one of ordinary skill in the art would find it obvious to reduce or completely stop the supply and production of low purity oxygen (the work of mixing column 6, FIG. 2) when said oxygen is not needed while still supplying the high purity oxygen (the work of the double column 2, FIG. 2) in order to consume less energy and improve the cost efficiency of the system.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of AAPA, to have the first separator providing the impure oxygen using process and apparatus for distilling air and application in feeding gas to a converter of a steel mill, wherein outside air is imported and supplied to a lower part of a mixing column, wherein outside air is also imported to the lower part of the mean pressure column providing impure nitrogen and "rich liquid" (oxygen enriched air) to the top of the low pressure column, from where liquid oxygen is sent to the top of the mixing column, as taught by Camberlein, in order to simultaneously produce impure oxygen used in blast furnaces and pure oxygen used in converters of a steel mill and to reduce or completely stop the supply and production of low purity oxygen (the work of mixing column) when said oxygen is not needed while still supplying the high purity oxygen (the work of the double column) in order to consume less energy and improve the cost efficiency of the system.

In reference to claim 18, AAPA and Camberlein teach the apparatus as explained in the rejection of claim 17, and AAPA teaches that the first consuming unit is a blast furnace (page 1, lines 24-27) and the second consuming unit is a converter or an arc furnace (page 1, lines 27-29).

In reference to claim 19, AAPA and Camberlein teach the method as explained in the rejection of claim 18, and AAPA teaches means for feeding the blast furnace with low-purity oxygen from the first air separation unit (page 1, lines 29-33), but does not teach means for stopping the low-purity oxygen being sent from the first air separation unit to the blast furnace. Camberlein shows the apparatus for distilling air and application in feeding gas to a converter of a steel mill (FIG. 2; col 4, lines 7-9), comprising a mixing column (6, FIG. 2; col 3, lines 9-12), a mean pressure column (3, FIG. 2) and a low pressure column (4, FIG. 2) in order to simultaneously produce impure oxygen (col 3, lines 19-22) used in blast furnaces (via line 18, FIG. 2; col 1, lines 11-16) and pure oxygen (col 3, lines 38-43) used in converters of a steel mill (col 4, lines 7-13). Additionally, one of ordinary skill in the art would find it obvious to reduce or completely stop the supply and production of low purity oxygen (the work of mixing column 6, FIG. 2) by providing a solenoid valve when said oxygen is not needed while still supplying the high purity oxygen (the work of the double column 2, FIG. 2) in order to consume less energy and improve the cost efficiency of the system.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of AAPA and Camberlein, to reduce or completely stop the supply and production of low purity oxygen (the work of mixing column) by providing a solenoid valve when said oxygen is not needed while still supplying the high purity oxygen (the

work of the double column) in order to consume less energy and improve the cost efficiency of the system.

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Camberlein as applied to claim 13 above, and further in view of U.S. Patent 6,062,043 to Magnet et al. (Magnet).

In reference to claim 14, AAPA and Camberlein teach the method as explained in the rejection of claim 13, and AAPA teaches that during the first step, the blast furnace is supplied with oxygen-enriched air (impure oxygen, page 1, lines 24-27) but does not teach that during the second step the blast furnace is fed either with air or with air less oxygen-enriched than that with which it is fed during the first step. Magnet teaches a process for feeding a gas consuming unit (FIG. 4) wherein the furnace (HF, FIG. 4) is either fed with air (via blower 21, FIG. 4) or with a combination of air and oxygen enriched air (via blower 21A, FIG. 4) in order to compress the air with blowers that may be of different sizes so that only one of these blowers will need safety measures to avoid problems due to oxygen concentration (col 2, lines 37-41).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of AAPA and Camberlein, wherein the furnace is either fed with air or with a combination of air and oxygen enriched air, as taught by Magnet, in order to compress the air with blowers that may be of different sizes so that only one of these blowers will need safety measures to avoid problems due to oxygen concentration.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 6,576,040 to Magnet et al. teaches the process and plant with oxygen-enriched air feed for a non-ferrous metal production unit.

U.S. Patent RE37,014 to Guillard et al. teaches combined installation of a metal production unit and a unit for the separation of air gas.

U.S. Patent 5,882,373 to Guillard et al. teaches a method of running plant comprising a metal treatment unit and a gas treatment unit.

U.S. Patent 5,505,052 to Ekins et al. teaches a process and unit for supplying a gas under pressure to an installation that consumes a constituent of air.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Filip Zec whose telephone number is 571-270-5846. The examiner can normally be reached on Monday-Friday, from 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisors, Frantz Jules or Cheryl Tyler can be reached on 571-272-6681 or 571-272-4834, respectively. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Cheryl J. Tyler/
Supervisory Patent Examiner, Art Unit 3744

/F. Z./
Examiner, Art Unit 3744

9/9/2010